Consumers' Behavior Regarding Food Waste Prevention

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Glossary

Food loss a decrease in mass (dry matter) or nutritional value (quality) of food that was originally intended but is no more suitable for human consumption (FAO, 2013).

Food waste composed of raw or cooked food materials and includes food loss, before, during or after meal preparation in the household, as well as food discarded in the process of manufacturing, distribution, retail and food service activities (EC, 2011).

Avoidable losses food and drink thrown away that was, at some point prior to disposal, edible (e.g. slice of bread, apples, meat).

Possible avoidable losses food and drink that some people eat and others do not (e.g. bread crusts), or that can be eaten when a food is prepared in one way but not in another (e.g. potato skins).

Unavoidable losses waste arising from food or drink preparation that is not, and has not been, edible under normal circumstances (e.g. meat bones, egg shells, pineapple skin, tea leafs).

Abstract

Food wastage is a societal, environmental and financial problem that takes places along the entire food supply chain. Therefore, prevention of the food wasted is a key goal towards sustainable development. Consumers, as a very active stakeholder of the food supply chain, affect food waste generation directly and indirectly via a multitude of behaviors. This chapter reviews consumer behavior characteristics aiming towards the prevention of food waste generation.

Introduction

The generation of food waste is a global environmental, financial and social challenge. In the early 2010s the Food and Agricultural Organization of the United Nations estimated that approximately one-third of food produced for human consumption is either lost or wasted through the food supply chain (FSC), from agricultural production and post-harvest handling and storage to processing, transportation, distribution and consumption (Gustavsson et al., 2011).

Food wastage is generated in every sector of the FSC, namely agriculture, processing, wholesales-retails, households and food services. However, the contribution of each FSC sector to food wastage differs substantially due to a range of reasons dependent on the socio-economic conditions of each country (European Commission, 2010; FAO, 2013). Food wastage is defined as the sum of food losses (wastage that is generated in the harvest and immediate post-harvest stages of the FSC) plus food waste (wastage that is generated in the retail and consumer stages of the FSC). Moreover, the distinction between food losses and food waste has a clear geographical distribution: food losses are higher in the developing countries, while food waste of perishable foods is dominant in the industrialised and developed economies (Parfitt et al., 2010). Food waste generation in the consumers' households is the result of the dynamic interaction among retail, food services and the consumers.

Food wastage places a heavy economic burden on all the players in the FSC. Food waste is definitely a financial loss for consumers; it is also a loss for retailers, when it takes place within the boundaries of their operation; and finally, food waste is a loss for the waste management system, which has to manage food waste, safely and effectively.

Food waste generation causes also a heavy environmental burden for the whole planet. When edible food is wasted all the resources and energy required, in addition to the emissions of all kinds of pollutants generated, for its production, processing,

transportation, cooking and delivery are ending up as waste. It is estimated that the global food sector accounts for around 30% of the world's total energy consumption and around 22% of total Greenhouse Gas emissions (United Nations Sustainable Development Goals).

And finally, food wastage is a global social problem. The United Nations estimate that 1.3 billion tonnes of edible food is wasted every year while in the same time almost 1 billion people go undernourished and another 1 billion hungry (United Nations Sustainable Development Goals).

For all the aforementioned reasons, United Nations included food waste prevention among the sustainable development Goal 12 ("Ensure sustainable consumption and production patterns") targets aiming at halving by 2030, the per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses (United Nations Sustainable Development Goals).

The Implications of Food Waste Generation for Consumers

Food waste at the consumer level is characterised as either avoidable, unavoidable or possibly avoidable. Avoidable food waste includes food and drink thrown away that was edible, at some point prior to disposal (e.g. slice of cake, oranges, milk) while unavoidable food waste includes waste arising from food or drink preparation that is not edible under normal circumstances (e.g. fish bones, egg shells, tea leafs). Possibly avoidable is food waste that is generated from the difference arising between the preferences of the consumer and the way of cooking or serving (e.g. baked potatoes vs. boiled potatoes) which derives from different consumption and cultural patterns.

The focus of all initiatives is in the prevention of the avoidable fraction of food waste. There is growing evidence that the contribution of the households to the food waste problem is particularly significant (Sharp et al., 2010; European Commission, 2010). For instance, in EU-27, households are responsible for 42% of the total amount of food waste generated (European Commission, 2010). Therefore, consumers are in the centre of food waste prevention initiatives. Food waste prevention, via a multitude of consumer behaviors, relates to food provisioning. More specifically, consumers may enhance or may prevent food waste generation via their planning routines, their shopping habits, their cooking skills and via their overall food management behavior. The study of consumer behavior that yields food waste, via the engagement of behavioral models, is well documented (Stancu et al., 2016).

Consumers feel bad about wasting food and are very concerned when they throw food away. They are concerned about food waste generation mainly because it is a waste of money and secondly because it is a waste of edible food (Graham-Rowe et al., 2014; Lyndhurst, 2007). Complementary to this argument, financial concerns proved to be the strongest factor that motivates consumers to reduce food waste (Quested et al., 2013).

On the other hand, consumers like their convenience; they prefer to buy larger quantities of food in order to avoid extra trips to the shops (Graham-Rowe et al., 2014). However, larger quantities of food, if not used in time, end up as waste. Therefore, proper food management and planning are required.

There are more consumer behaviors related directly to planning that reduce food waste generation: consumers should make a list when going for shopping, because the more often consumers make unplanned purchases, the higher the levels of waste; consumers should avoid cooking more than they need; and finally, consumers should avoid serving more food than it is needed. However, note that despite a perfect shopping and cooking plan, change of plans (e.g. an unexpected visit by friends) and accidents (e.g. fall and breakage of a milk carton) also happen in the households that yield to food spoilage.

Consumers don't like to generate food waste. One of the strongest drivers for consumers to generate food waste is because they want to provide fresh and nutritious food to their loved ones. The wish to be a "good provider" in terms of providing healthy and/or abundant food for family and guests is a strong barrier to food waste prevention (Evans, 2012; Graham-Rowe et al., 2014).

Therefore, consumers want to buy only the best products; the retailers, trying to provide the best for their customers, generate more food waste. Consumers relate freshness with the external appearance of food products, especially fruits and vegetables. This leads to the generation of more food loss along the supply chain, prior to the consumption. There are already marketing related efforts to increase the acceptance of visually impaired food products by attracting consumer attention by means of packaging design and better product and price presentation (Helmert et al., 2017).

The influence of food labeling on food waste generation by consumers has been greatly investigated. Various date labels exist throughout the world that aim to inform the consumers on the quality characteristics of food items. However, it seems that all these labels are rather confusing and are clearly not observed or even known by the consumers. Research evidence shows that consumers can better follow and comprehend the "expiration" date label compared to the "best used before" date label (Abeliotis et al., 2014). The "expiration" date indicates the date after which eating the food may be unsafe. Whereas, the "best used before" date indicates the date until when the food is expected to retain its optimal conditions. Thus, when the "best used before" expires, the consumer does not need to throw the food away. In any case, confusion about the correct meaning of the date labels of food items yields to higher levels of food waste generation. Consumers need education and training in order to comprehend correctly the content of food date labels.

Consumers should know which is the best way to store a food product. Proper food storing at home is a crucial factor for extending the life span of food items. Among food storage alternatives, the role of refrigeration is critical for the preservation of cooked or uncooked food items. Refrigeration is important for products such as dairy, meat and vegetables. Storing food products at a temperature of 4 °C extends or maintains their storage life. Moreover, freezing is a storage alternative that will keep products safe for a very

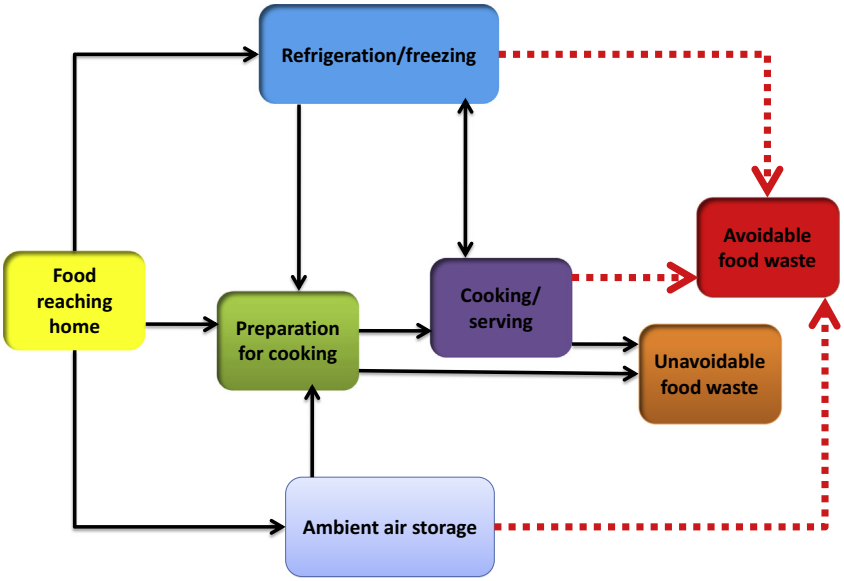

Figure 1 The possible routes of consumer food management that relate to food waste generation.

long time. Foods suitable for freezing are bread, leftovers and meat. It is even suggested that it is possible to reduce food waste at the household level by encouraging consumers to use certain foods more frequently in a frozen form (Janssen et al., 2017).

Proper cooking skills of consumers yield to food waste prevention due to the use of well preserved leftovers. Consumers who had cooking skills and food storage knowledge reported lower levels of food waste (Graham-Rowe et al., 2014; Lyndhurst, 2007). A reasonable explanation for this finding is that the wish to protect human health combined with lack of proper cooking skills and storage knowledge, leads consumers to fear of food poisoning. Therefore, in order to risk illness from food poisoning, they prefer to throw food away (Visschers et al., 2016).

In order to visualize the aforementioned consumer behaviors, Fig. 1 presents a simplified diagram of the fate of food reaching home. Solid black lines denote the normal flow of food, while dotted red lines denote food diverted to avoidable waste. More specifically, food reaching at home can be directed directly to preparation for cooking (e.g. meat or fish), or to the refrigerator (e.g. meat, fish and dairy products), or to ambient air storage (e.g. pasta, rice, potatoes). Food from the refrigerator can be either directed to preparation for cooking or to cooking directly; vice-versa, excess cooked food or food that has been served can be directed to the refrigerator for preservation or deep freezing. Similarly, food from open air storage can be directed to the preparation for cooking (e.g. potatoes) or cooking directly (e.g. pasta).

Preparation for cooking, cooking and serving, normally, generate unavoidable food waste (e.g. meat and fish bones, leftovers from vegetables, carrots and potato skins).

Cooked food can take the road to avoidable waste if it is served in large quantities, or from other situational factors such as the presence of young kids in the household that don't like the served food or people that are ill. Food stored in ambient air can take the road to avoidable waste if it is rotten due to poor management. Food from the refrigerator can end up in the waste bin if it is refrigerated for a very long time; or if it past its "expiration" date; or if it past its "best use before" date.

Consumer behavior is also in the epicenter of the food saving actions of the other actors of the food supply chain, e.g. supermarkets and retailers. For instance, supermarkets, in order to reduce food waste, offer food items at reduced price, when these food items are close to the expiration date or are perceived as suboptimal (Aschemann-Witzel et al., 2016).

The Effect of Sociodemographic Characteristics of Consumers on Food Waste Generation

Food waste generation by households is strongly associated with certain socio-economic characteristics of the consumers. Starting from income, food waste generation is definitely associated with financially affluent consumers, probably because the associated to food waste monetary losses are not considerable portions of their income (Thyberg and Tonjes, 2016). Lower amounts of food waste generated are associated with lower income (Abeliotis et al., 2016; Stancu et al., 2016). It is reported that among the various food items, vegetables and fruits have the highest wastage rates as they are often over-purchased because they are generally cheaper compared to other food groups like meat and fish. The overstocking by consumers of vegetables and fruits, combined with their shorter shelf life, yields to increased food waste generation rates.

Then, focusing on the number of the members of the household, larger households generate more food waste, as expected. However, the per capita generation of food waste is lower in households with more members: people in four-person households generated approximately half the amount of food waste per capita compared to single-occupancy homes (WRAP, 2009). Moreover,

Figure 2 Key consumer characteristics related to food waste generation.

households with young children generate more food waste; on the contrary, older consumers generate lower quantities of food waste (Visschers et al., 2016). Fig. 2 summarizes the effect of key consumer characteristics on the generation of food waste.

Consumers Focus on Prevention

Consumers should always focus on the prevention of food waste generation along the entire food supply chain. Therefore, in order to prevent food waste generation by retailers, prevention must incorporate consumer practices to expand the accessibility of people on still edible foods that are older, less aesthetically pleasing, and those close to their expiration dates (Neff et al., 2015). Moreover, since the main purpose of food provision is human intake, the donation of food to people in need is a sustainable act par excellence (Schneider, 2013) and must always be the first choice of consumers that have excess food to provide.

Conclusions

Food wastage is a global problem that takes place all over the globe along the various stages of the food supply chain. Focusing on the households in the developed part of the world, food waste generation causes severe financial, environmental and social concerns. Everyday consumer decisions and behaviors generate, directly or indirectly, unnecessary quantities of food waste. Therefore, consumer behavior is in the center of the efforts for the prevention of edible food waste. A review of the main drivers and obstacles that consumers phase towards the prevention of food waste generation has been presented. The generation of food waste by consumers is the final outcome of a complex mix of everyday behaviors. Via proper education and training, aiming at behavioral change, consumers are also drivers for change towards the reduction of food waste generation.

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